CLAIMS

What is claimed is:

1. A method of ultrasound imaging comprising:

providing a hand-held probe housing having a transducer array, an interface unit connected to the probe housing and a personal computer connected to the interface unit;

receiving ultrasound signals with the transducer array from a region of interest and generating a continuous time input signal;

sampling the continuous time input signal and generating discrete time sampled signals;

delaying the discrete time sampled signals with a beamformer circuit;

generating an electronic representation of the region of interest with the delayed discrete time sampled signals; and

forwarding the electronic representation from the interface unit to the personal computer.

2. The method of claim 1 wherein the sampling step further comprises generating analog discrete time sampled signals.

3. The method of claim 1 wherein the hand-held housing is selected from the group comprising a linear array probe, a curved array probe, and a phased array probe.

4. The method of claim 1 further comprising providing an interface circuit having a digital signal processor.

5. The method of claim 1 further comprising providing a cable between the interface unit and personal computer and sending real-time data along the cable.

6. The method of claim 1 wherein the delaying step further comprises providing a charge coupled device (CCD) beamformer circuit.

7. The method of claim 5 wherein the step of sending real-time data further comprises sending digital data along the cable.

8. The method of claim 1 wherein the step of providing a personal computer further comprises providing a portable computer with a liquid crystal display.

9. The method of claim 1 wherein the step of providing a personal computer further comprises providing a laptop computer.

10. The method of claim 1 wherein the step of providing a personal computer further comprises providing a handheld computer.

11. The method of claim 5 further comprising filtering the real-time data with a filter.

12. The method of claim 5 further comprising demodulating the real-time data.

13. The method of claim 1 further comprising transmitting beamformer circuit control signals from the interface to the probe housing.

14. The method of claim 1 further comprising providing a wireless connection between the interface and a computer.

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15. The method of claim 1 wherein the providing step further comprises providing a two dimensional transducer array.

16. The method of claim 5 further comprising a modem connected to the computer.

17. The method of claim 5 wherein the providing step further comprises providing a probe housing, an interface, a computer and a cable having a weight of ten pounds or less.

18. The method of claim 1 further comprising providing a computer housing and a cable connecting the interface to the computer housing.

19. The method of claim 18 further comprising providing a battery and scan conversion circuitry within the computer.

20. The method of claim 1 wherein the generating step further comprises generating a plurality of images of the region of interest and selecting one of the images on a display.

21. The method of claim 20 further comprising storing the selected image in an electronic memory.

22. The method of claim 20 wherein the generating step further comprises generating a real time series of images of the region of interest on a display, and freezing an image on the display, or alternatively, alter the image as a function of depth in the region of interest.

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23. The method of claim 1 further comprising providing a windows operating system on the personal computer.

24. The method of claim 1 further comprising providing a display connected to the personal computer and a graphical user interface.

25. An ultrasound imaging system comprising:

a hand-held probe housing having a transducer array circuit, the transducer array circuit generating a continuous time input signal;

a beamformer circuit that samples and delays the continuous time input signal and generates discrete time sampled signals;

a summing circuit that generates an electronic representation of the region of interest with the delayed discrete time sampled signals;

an interface unit connected to the probe housing;

a data processor housing having a data processor; and

a cable connecting the interface unit to the data processor housing such that the electronic representation is conducted along the cable to the data processor.

26. The system of claim 25 wherein the hand-held housing is selected from the group comprising a linear array probe, a curved array probe, and a phased array probe.

27. The system of claim 25 further comprising a second cable connecting the interface circuit and the probe housing.

28. The system of claim 25 wherein the beamformer circuit further comprises a charge coupled device (CCD) beamformer circuit.

29. The method of claim 25 further comprising an analog to digital converter such that digital data is directed along the cable.

30. The system of claim 25 wherein the data processor further comprises a personal computer.

31. The system of claim 25 wherein the data processor further comprises a laptop computer.

32. The system of claim 25 wherein the data processor further comprises a handheld computer.

33. The system of claim 25 further comprising a filter that filters the electronic representation.

34. The system of claim 25 further comprising a demodulator that demodulates the data.

35. The system of claim 25 further comprising a beamformer control circuit in the data processor housing that sends beamformer control signals to the probe housing.

36. The system of claim 25 the beamformer circuit further comprises a plurality of programmable tapped delay lines.

37. The system of claim 25 further comprising a battery providing power to the data processor.

38. The system of claim 25 further comprising a scan conversion circuit that converts the electronic representation from polar coordinates to rectangular coordinates.

39. The system of claim 25 further comprising a keyboard and a flat panel display on the data processor housing.

40. An ultrasound imaging system comprising:

a hand-held probe housing having a two dimensional transducer array, the transducer array receiving signals from a region of interest and that generates an input signal;

a beamformer circuit that samples the input signal and that generates discrete time sampled signals, the beamformer circuit delaying the discrete time sampled signals;

a summing circuit that generates an electronic representation of the region of interest with the delayed discrete time sampled signals; and

a cable that connects an interface unit to a personal computer having a graphical user interface and a display such that the electronic representation is conducted along the cable to the computer.

41. The system of claim 40 wherein the hand-held probe housing is selected from the group comprising a linear array probe, a curved array probe, and a phased array probe.

42. The system of claim 40 further comprising a second cable that connects the interface unit and the probe housing.

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43. The system of claim 40 wherein the beamformer circuit further comprises a charge coupled device (CCD) beamformer circuit.

44. The system of claim 40 wherein the personal computer further comprises a scan conversion program.

45. The system of claim 40 wherein the computer comprises a laptop computer.

46. The system of claim 40 wherein the computer comprises a handheld computer.

47. The system of claim 40 further comprising a filter in the probe housing that filters the delayed signals.

48. The system of claim 40 further comprising a demodulator that demodulates the delayed signals.

49. The system of claim 40 further comprises a beamformer control circuit that transmits signals from the computer to the probe housing.

50. The system of claim 40 wherein the two dimensional array comprises a plurality of rows, each row comprising a linear array.

51. The system of claim 40 wherein the two dimensional array comprises a plurality of parallel rows such that one of the rows is longer than another of the rows.

52. The system of claim 40 further comprising a virtual control panel.

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53. The system of claim 40 wherein the personal computer further comprises a windows operating system.

54. The system of claim 40 further comprising a disk data storage system such that images can be stored on a disk.

55. The system of claim 40 wherein the display comprises a flat panel display.

56. The system of claim 40 wherein the display comprises a liquid crystal display.

57. The system of claim 40 wherein the interface unit comprises a processor circuit.

58. The system of claim 40 wherein the personal computer comprises a doppler processor.

59. The system of claim 40 further comprising a modem for remote transmission of image data.

60. The system of claim 40 further comprising a battery that provides power to the computer, the interface and the probe housing.

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